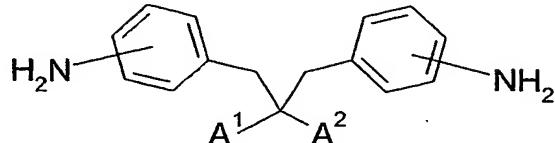


CLAIMS

1. Diamine compounds represented by the general formula I:

5

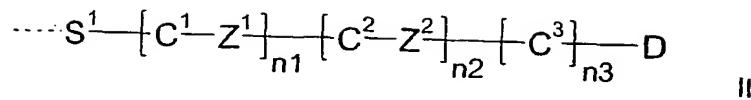


wherein

A¹ represents an organic group of 1 to 40 carbon atoms;
10 A² represents a hydrogen atom or an organic group of 1 to 40 carbon atoms.

2. Diamine compounds according to claim 1, wherein A¹ and A² each independently represent a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono-substituted by cyano or fluorine, chlorine, or poly-substituted by fluorine or chlorine, having 1 to 40 carbon atoms, wherein one or more -CH₂- groups may independently be replaced by a group B, with the proviso that oxygen atoms are not directly attached to each other, wherein B represents a group selected from -O-, -CO-, -CO-O-, -O-CO-, -NR¹-, -NR¹-CO-, -CO-NR¹-, -NR¹-CO-O-, -O-CO-NR¹-, -NR¹-CO-NR¹-, -CH=CH-, -C≡C-, -O-CO-O- and -Si(CH₃)₂-O-Si(CH₃)₂- and wherein R¹ represents a hydrogen atom or lower alkyl.

25 3. Diamine compounds according to claims 1 or 2, wherein A¹ and A² each independently preferably represent a mesogen group represented by general formula II:



wherein

5 C^1 to C^3 each independently represent an aromatic or an alicyclic group, which is unsubstituted or mono- or poly-substituted by a cyano group or by halogen atoms, or by a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, having 1 to 18 carbon atoms, wherein one or more non-
10 adjacent - CH_2 - groups may independently be replaced by a group B;

D represents a hydrogen atom, a halogen atom, a cyano group, or a straight-chain or branched alkyl residue which is unsubstituted, mono-
15 substituted by cyano or fluorine, chlorine, or poly-substituted by fluorine, chlorine, having 1 to 24 carbon atoms, wherein one or more non-adjacent - CH_2 - groups may independently be replaced by a group B, or represents a organic group having a steroid skeleton;

S¹ represents a single bond or a spacer unit such a straight-chain or
20 branched alkylene group which is unsubstituted, mono or poly-
 substituted by a cyano group or by halogen atoms, having 1 to 24 carbon atoms, wherein one or more non-adjacent - CH_2 - groups may independently be replaced by a group B;

Z¹ , Z² each independently of the other represent a single bond or a spacer unit such a straight-chain or branched alkylene group which is unsubstituted, mono or poly-substituted by a cyano group or by halogen atoms, having 1 to 8 carbon atoms, wherein one or more non-adjacent - CH_2 - groups may independently be replaced by a group B;
30

n1 to n3 are each independently 0 or 1; and

B is as defined above,

with the proviso that if $n_1 = n_2 = n_3 = 0$ then D is a straight-chain or branched alkyl residue which is unsubstituted, mono-substituted by cyano or fluorine, chlorine, or poly-substituted by fluorine, chlorine, having 5 to 24 carbon atoms, wherein one or more non-adjacent $-CH_2-$ groups may independently be replaced by a group B, or represents a organic group having a steroid skeleton.

10 4. Diamine compounds according to claim 3, wherein C¹ to C³ are selected from pyrimidine-2,5-diyl, pyridine-2,5-diyl, 1,4- or 2,6-naphthylene, decahydronaphthalin-2,6-diyl, 1,2,3,4-tetrahydronaphthalin-2,6-diyl, cyclohexane-1,4-diyl and 1,4-phenylene, which is unsubstituted or substituted by a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly-substituted by fluorine, chlorine having from 1 to 12 carbon atoms in which optionally one or more non-adjacent $-CH_2-$ groups are replaced by -O-, -CO-, -CO-O-, -O-CO-, -CH=CH- and -C≡C-.

15 5. Diamine compounds according to claim 3 or 4, wherein C¹ to C³ are selected from cyclohexane-1,4-diyl and 1,4-phenylene, which is unsubstituted or substituted by a cyclic, straight-chain or branched alkyl residue having 1 to 12 carbon atoms in which optionally one or more non-adjacent $-CH_2-$ groups are replaced by -O-, -CO-, -CO-O-, -O-CO-, -CH=CH- and -C≡C-.

20 6. Diamine compounds according to anyone of claims 3 to 5, wherein D is a hydrogen atom, a fluoro atom, a chloro atom, a cyano group or a straight-chain or branched alkyl residue which is unsubstituted, mono-substituted by cyano or fluorine, chlorine, or poly-substituted by fluorine, chlorine, having 1 to 18 carbon atoms, wherein one or more non-adjacent $-CH_2-$ groups may independently be replaced by -O-, -CO-, -CO-O-, -O-CO-, -NR¹-CO-, -CO-NR¹-, -NR¹-CO-O-, -O-CO-NR¹-, -CH=CH-, -C≡C- and -O-CO-O-, wherein R¹ represents a

hydrogen atom or lower alkyl, or represents an organic group having a steroid skeleton.

7. Diamine compounds according to anyone of claims 3 to 6, wherein D is a hydrogen atom, a fluoro atom, a chloro atom, a cyano group or a straight-chain or branched alkyl residue, having 1 to 12 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by -O-, -CO-, -CO-O-, -O-CO-, -CH=CH-, -C≡C- and -O-CO-O-.

10 8. Diamine compounds according to anyone of claims 3 to 7, wherein S¹ is selected from a single covalent bond, -CO-O-, -CO-NR¹-, -CO- and a straight-chain or branched alkylene group which is unsubstituted, mono or poly-substituted by fluorine, chlorine and cyano, having 1 to 24 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by a group B, wherein R¹ represents a hydrogen atom or lower alkyl.

15 9. Diamine compounds according to anyone of claims 3 to 8, wherein S¹ is selected from a single covalent bond, -CO-O-, -CO-, -(CH₂)_r, -(CH₂)_rO-, -(CH₂)_rCO-, -(CH₂)_rCO-O-, -(CH₂)_rO-CO-, -(CH₂)_rCO-NR¹-, 20 -(CH₂)_rNR¹-CO-, -(CH₂)_rNR¹-, -CO-O-(CH₂)_r, -CO-NR¹-(CH₂)_r, -CO-O-(CH₂)_rO-, -CO-NR¹-(CH₂)_rO-, -CO-NR¹-(CH₂)_rNR¹-, -CO-NR¹-(CH₂)_rO-CO-, -(CH₂)_rO-(CH₂)_s-, -(CH₂)_rCO-O-(CH₂)_s-, 25 -(CH₂)_rO-CO-(CH₂)_s-, -(CH₂)_rNR¹-CO-(CH₂)_s-, -(CH₂)_rNR¹-CO-O-(CH₂)_s-, -(CH₂)_rO-(CH₂)_sO-, -(CH₂)_rCO-O-(CH₂)_sO-, -(CH₂)_rO-CO-(CH₂)_sO-, -(CH₂)_rNR¹-CO-(CH₂)_sO-, -(CH₂)_rNR¹-CO-O-(CH₂)_sO-, -CO-O-(CH₂)_rO-(CH₂)_sO- and -CO-O-(CH₂)_rO-(CH₂)_sO-, wherein R¹ is as defined above, r and s each represent an integer from 1 to 20, preferably from 1 to 12, and r + s ≤ 21, preferably ≤ 15.

30 10. Diamine compounds according to anyone of claims 3 to 9, wherein S¹ is selected from a single covalent bond, -(CH₂)_r, -(CH₂)_rO-, -(CH₂)_rCO-O-, -(CH₂)_rO-CO-, -(CH₂)_rCO-NH-, -(CH₂)_rNH-CO-, -CO-O-(CH₂)_r,

-CO-NH-(CH₂)_r, -CO-O-(CH₂)_rO-, -CO-NH-(CH₂)_rO-,
-(CH₂)_rNH-CO-(CH₂)_s-, -(CH₂)_rNH-CO-O-(CH₂)_s-, -(CH₂)_rO-(CH₂)_sO-,
-(CH₂)_rNH-CO-(CH₂)_sO-, -(CH₂)_rNHCO-O-(CH₂)_sO-,
-CO-O-(CH₂)_rO-(CH₂)_sO-, and -CO-(CH₂)_rNH-CO-(CH₂)_sO-, wherein r and
5 s each represent an integer from 1 to 12 and r + s ≤ 15.

11. Diamine compounds according to anyone of claims 3 to 10, wherein S¹ include 1,2-ethylene, 1,3-propylene, 1,4-butylene, 1,5-pentylene, 1,6-hexylene,
1,7-heptylene, 1,8-octylene, 1,9-nonylene, 1,10-decylene, 1,11-undecylene,
10 1,12-dodecylene, 3-methyl-1,4-butylene, 2-(methylenoxy)ethylene, 3-(methylenoxy)propylene, 4-(methylenoxy)butylene, 5-(methylenoxy)pentylene, 6-(methylenoxy)hexylene, 7-(methylenoxy)heptylene, 8-(methylenoxy)octylene, 9-(methylenoxy)nonylene, 10-(methylenoxy)decylene,
11-(methylenoxy)undecylene, 12-(methylenoxy)dodecylene,
15 2-(carbonyloxy)ethylene, 3-(carbonyloxy)propylene, 4-(carbonyloxy)butylene, 5-(carbonyloxy)pentylene, 6-(carbonyloxy)hexylene, 7-(carbonyloxy)heptylene, 8-(carbonyloxy)octylene, 9-(carbonyloxy)nonylene, 10-(carbonyloxy)decylene, 11-(carbonyloxy)undecylene, 12-(carbonyloxy)dodecylene,
2-(carbonylamino)ethylene, 3-(carbonylamino)propylene,
20 4-(carbonylamino)butylene, 5-(carbonylamino)pentylene, 6-(carbonylamino)hexylene, 7-(carbonylamino)heptylene, 8-(carbonylamino)octylene, 9-(carbonylamino)nonylene, 10-(carbonylamino)decylene, 11-(carbonylamino)undecylene, 12-(carbonylamino)dodecylene, 3-propyleneoxy, 3-propyleneoxycarbonyl,
25 2-ethylenoyloxy, 4-butyleneoxy, 4-butyleneoxycarbonyl, 3-propylenoyloxy, 5-pentyleneoxy, 5-pentyleneoxycarbonyl, 4-butylenoyloxy, 6-hexyleneoxy, 6-hexyleneoxycarbonyl, 5-pentylenoyloxy, 7-heptyleneoxy, 7-heptyleneoxycarbonyl, 6-hexylenoyloxy, 8-octyleneoxy, 8-octyleneoxycarbonyl, 7-heptylenoyloxy, 9-nonyleneoxy,
30 9-nonyleneoxycarbonyl, 8-octylenoyloxy, 10-decyleneoxy, 10-decyleneoxycarbonyl, 9-nonylenoyloxy, 11-undecyleneoxy, 11-undecyleneoxycarbonyl, 10-decyleneoxy, 12-dodecyleneoxy,

12-dodecyleneoxycarbonyl, 11-undecylenoyloxy, 3-propyleneaminocarbonyl,
4-butyleneaminocarbonyl, 5-pentyleneaminocarbonyl,
6-hexyleneaminocarbonyl, 7-heptyleneaminocarbonyl,
8-octyleneaminocarbonyl, 9-nonyleneaminocarbonyl,
5 10-decyleneaminocarbonyl, 11-undecyleneaminocarbonyl,
12-dodecyleneaminocarbonyl, 2-ethylenecarbonylamino,
3-propylenecarbonylamino, 4-butylenecarbonylamino,
5-pentylenecarbonylamino, 6-hexylenecarbonylamino,
7-heptylenecarbonylamino, 8-octylenecarbonylamino,
10 9-nonylenecarbonylamino, 10-decylene carbonylamino,
11-undecylenecarbonylamino, 2-(methylenoxy)ethanoyloxy,
3-(methylenoxy)propyloxy, 3-(methylenoxy)propyloxycarbonyl,
4-(methylenoxy)butyloxy, 4-(methylenoxy)butyloxycarbonyl,
3-(methylenoxy)propanoyloxy, 5-(methylenoxy)pentylloxy,
15 5-(methylenoxy)pentylloxycarbonyl, 4-(methylenoxy)butanoyloxy,
6-(methylenoxy)hexyloxy, 6-(methylenoxy)hexyloxycarbonyl,
5-(methylenoxy)pentanoyloxy, 7-(methylenoxy)heptyloxy,
7-(methylenoxy)heptyloxycarbonyl, 6-(methylenoxy)hexanoyloxy,
8-(methylenoxy)octyloxy, 8-(methylenoxy)octyloxycarbonyl,
20 7-(methylenoxy)heptanoyloxy, 9-(methylenoxy)nonyloxy,
9-(methylenoxy)nonyloxycarbonyl, 8-(methylenoxy)octanoyloxy,
10-(methylenoxy)decyloxy, 10-(methylenoxy)decyloxycarbonyl,
9-(methylenoxy)nonanoyloxy, 11-(methylenoxy)undecyloxy,
11-(methylenoxy)undecyloxycarbonyl, 10-(methylenoxy)decanoyloxy,
25 12-(methylenoxy)dodecyloxy, 12-(methylenoxy)dodecylloxycarbonyl,
11-(methylenoxy)undecanoyloxy, 3-(methylenoxy)propylaminocarbonyl,
4-(methylenoxy)butylaminocarbonyl, 5-(methylenoxy)pentylaminocarbonyl,
6-(methylenoxy)hexylaminocarbonyl, 7-(methylenoxy)heptylaminocarbonyl,
8-(methylenoxy)octylaminocarbonyl, 9-(methylenoxy)nonylaminocarbonyl,
30 10-(methylenoxy)decylaminocarbonyl, 11-(methylenoxy)undecylaminocarbonyl,
12-(methylenoxy)dodecylaminocarbonyl, 2-(methylenoxy)ethanoylamino,
3-(methylenoxy)propanoylamino, 4-(methylenoxy)butanoylamino,

5-(methylenoxy)pentanoylamino, 6-(methylenoxy)hexanoylamino,
7-(methylenoxy)heptanoylamino, 8-(methylenoxy)octanoylamino,
9-(methylenoxy)nonanoylamino, 10-(methylenoxy)decanoylamino,
11-(methylenoxy)undecanoylamino, 12-(methylenoxy)dodecylaminocarbonyl,
5 2-(carbonyloxy)ethanoyloxy, 3-(carbonyloxy)propyloxy,
3-(carbonyloxy)propyloxycarbonyl, 4-(carbonyloxy)butyloxy,
4-(carbonyloxy)butyloxycarbonyl, 3-(carbonyloxy)propanoyloxy,
5-(carbonyloxy)pentyloxy, 5-(carbonyloxy)pentyloxycarbonyl,
4-(carbonyloxy)butanoyloxy, 6-(carbonyloxy)hexyloxy,
10 6-(carbonyloxy)hexyloxycarbonyl, 5-(carbonyloxy)pentanoyloxy,
7-(carbonyloxy)heptyloxy, 7-(carbonyloxy)heptyloxycarbonyl,
6-(carbonyloxy)hexanoyloxy, 8-(carbonyloxy)octyloxy,
8-(carbonyloxy)octyloxycarbonyl, 7-(carbonyloxy)heptanoyloxy,
9-(carbonyloxy)nonyloxy, 9-(carbonyloxy)nonyloxycarbonyl,
15 8-(carbonyloxy)octanoyloxy, 10-(carbonyloxy)decyloxy,
10-(carbonyloxy)decyloxycarbonyl, 9-(carbonyloxy)nonanoyloxy,
11-(carbonyloxy)undecyloxy, 11-(carbonyloxy)undecyloxycarbonyl,
10-(carbonyloxy)decanoyloxy, 12-(carbonyloxy)dodecyloxy,
12-(carbonyloxy)dodecyloxycarbonyl, 11-(carbonyloxy)undecanoyloxy,
20 3-(carbonyloxy)propylaminocarbonyl, 4-(carbonyloxy)butylaminocarbonyl,
5-(carbonyloxy)pentylaminocarbonyl, 6-(carbonyloxy)hexylaminocarbonyl,
7-(carbonyloxy)heptylaminocarbonyl, 8-(carbonyloxy)octylaminocarbonyl,
9-(carbonyloxy)nonylaminocarbonyl, 10-(carbonyloxy)decylaminocarbonyl,
11-(carbonyloxy)undecylaminocarbonyl,
25 12-(carbonyloxy)dodecylaminocarbonyl, 2-(carbonyloxy)ethanoylamino,
3-(carbonyloxy)propanoylamino, 4-(carbonyloxy)butanoylamino,
5-(carbonyloxy)pentanoylamino, 6-(carbonyloxy)hexanoylamino,
7-(carbonyloxy)heptanoylamino, 8-(carbonyloxy)octanoylamino,
9-(carbonyloxy)nonanoylamino, 10-(carbonyloxy)decanoylamino,
30 11-(carbonyloxy)undecanoylamino, 12-(carbonyloxy)dodecylaminocarbonyl
6-(3-propyleneaminocarbonyloxy)hexylène, 6-(3-propyleneoxy)hexylene,
6-(3-propyleneoxy)hexyloxy, 6-(3-propyleneaminocarbonyloxy)hexyloxy,

6-(3-propyleneaminocarbonyl)hexyl, 6-(3-propyleneaminocarbonyl)hexyloxy,
2-(1-methyleneoxy)ethyloxycarbonyloxy,
3-(1-methyleneoxy)propyloxycarbonyloxy,
6-(1-methyleneoxy)hexyloxycarbonyloxy, 2-(1-methyleneoxycarbonyl)ethylene,
5 3-(1-methyleneoxycarbonyl)propyloxycarbonyloxy,
6-(1-methyleneoxycarbonyl)hexyloxycarbonyloxy,
6-(3-propyleneoxycarbonyloxy)hexylene, 6-(3-propyleneoxycarbonyl)hexylene,
2-(1-methyleneaminocarbonyl)ethylene,
3-(1-methyleneaminocarbonyl)propylene,
10 6-(1-methyleneaminocarbonyl)hexylene,
6-(3-propyleneaminocarbonyloxy)hexylene,
6-(3-propyleneaminocarbonyl)hexylene and the like.

12. Diamine compounds according to anyone of claims 3 to 11, wherein Z¹
15 and Z² are selected from a single covalent bond or a spacer unit such as a
straight-chain or branched alkylene group, which is unsubstituted, mono or
poly-substituted by fluoro atoms, having 1 to 8 carbon atoms, wherein one or
more non-adjacent -CH₂- groups may independently be replaced by a group
selected from -O-, -CO-, -CO-O-, -O-CO-, -NR¹-CO-, -CO-NR¹-, -CH=CH-,
20 -C≡C-, and wherein R¹ represents a hydrogen atom or lower alkyl.

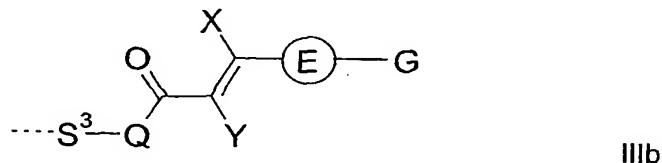
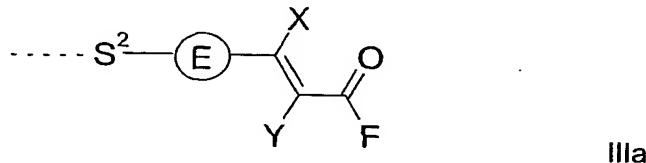
13. Diamine compounds according to anyone of claims 3 to 12, wherein Z¹
and Z² are selected from a single covalent bond or a spacer unit such as a
straight-chain or branched alkylene group having 1 to 4 carbon atoms, wherein
25 one or two non-adjacent -CH₂- groups may independently be replaced by a
group selected from -O-, -CO-, -CO-O-, -O-CO-.

14. Diamine compounds according to anyone of claims 3 to 13, wherein
n₂ = 1 and n₃ = 1.
30

15. Diamine compounds according to anyone of claims 3 to 14, wherein
n₁ = 0 with n₂ = 1 and n₃ = 1.

16. Diamine compounds according to anyone of claims 3 to 15, wherein D is an organic group having a steroid skeleton if $n_1+n_2+n_3 = 0$.
- 5 17. Diamine compounds according to anyone of claims 3 to 16, wherein the steroid skeleton is a 3-cholesteryl or a 3-cholestanyl residue.
- 10 18. Diamine compounds according to any preceding claim, wherein A¹ and A² each independently preferably represent a photoreactive group which can be photoisomerized and/or photodimerized on exposure to UV or laser light.
- 15 19. Diamine compounds according to claim 18, wherein the photoreactive groups are able to undergo photocyclization, in particular [2+2]-photocyclization.
- 20 20. Diamine compounds according to claims 18 or 19, wherein the photoreactive groups are sensitive to UV or laser light, in particular linearly polarized UV light.
- 25 21. Diamine compounds according to anyone of claims 18 to 20, wherein the photoreactive groups include cinnamates, benzylideneephthalimidines, benzylideneacetophones, diphenylacetylenes stilbazoles, uracyl, quinolinone, maleinimides, or cinnamylidene acetic acid derivatives, particularly preferred groups are cinnamates, coumarins, benzylideneacetophenones, or maleinimides.

22. Diamine compounds according to anyone of claims 18 to 21, wherein the photoreactive groups are represented by general formulae IIIa and IIIb:



5 wherein

E represents pyrimidine-2,5-diyi, pyridine-2,5-diyi, 2,5-thiophenylene, 2,5-furanylene, 1,4- or 2,6-naphthylene, or phenylene, which is 10 unsubstituted or mono- or poly-substituted by fluorine, chlorine or by a cyclic, straight-chain or branched alkyl residue which is unsubstituted mono- or poly-substituted by fluorine, chlorine, having 1 to 18 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by a group B as defined hereinabove;

15

F represents -OR², -NR³R⁴ or an oxygen atom, which defines together with the ring E a coumarin unit, wherein R², R³ and R⁴ are selected from hydrogen, a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, having 20 1 to 24 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by a group J, or R³ and R⁴ together form a C₅-8 alicyclic ring; wherein

20

25

J represents a group selected from -O-, -CO-, -CO-O-, -O-CO-, -NR¹-, -NR¹-CO-, -CO-NR¹-, -NR¹-CO-O-, -O-CO-NR¹-, -NR¹-CO-NR¹-, -CH=CH-, -C≡C-, -O-CO-O- and

-Si(CH₃)₂-O-Si(CH₃)₂-, an aromatic or an alicyclic group, and
wherein R¹ represents a hydrogen atom or lower alkyl;

5 G represents a hydrogen atom, or a halogen atom, or a straight-chain or
branched alkyl group which is unsubstituted, mono or poly-substituted
by cyano, fluorine, chlorine, having 1 to 24 carbon atoms, wherein one
or more -CH₂- groups may independently be replaced by a group J,
with the proviso that oxygen atoms are not directly attached to each
other;

10 S², S³ each independently of the other represent a single bond or a spacer
unit such as a straight-chain or branched alkylene group which is
unsubstituted, mono or poly-substituted by fluorine, chlorine, or cyano,
having 1 to 40 carbon atoms, wherein one or more -CH₂- groups may
15 independently be replaced by a group J, with the proviso that oxygen
atoms are not directly attached to each other;

20 Q represents an oxygen atom or -NR¹- wherein R¹ represents a hydrogen
atom or lower alkyl;

25 X, Y each independently of the other represents hydrogen, fluorine, chlorine,
cyano, alkyl optionally substituted by fluorine having 1 to 12 carbon
atoms in which optionally one or more non-adjacent alkyl -CH₂- groups
are replaced by -O-, -CO-O-, -O-CO- and/or -CH=CH-.

30 23. Diamine compounds according to claim 22, wherein E is selected from
pyrimidine-2,5-diyl, pyridine-2,5-diyl, 2,5-thiophenylene, 2,5-furanylene, 1,4- or
2,6-naphthylene and phenylene, which is unsubstituted or substituted by a
cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or
poly-substituted by fluorine, chlorine having 1 to 12 carbon atoms in which
optionally one or more non-adjacent alkyl -CH₂- groups are replaced by -O-,
-CO-, -CO-O-, -O-CO-, -CH=CH- and -C≡C-.

24. Diamine compounds according to claims 22 or 23, wherein E is selected from 2,5-furanylene, 1,4- or 2,6-naphthylene and phenylene, which is unsubstituted or substituted by a cyclic, straight-chain or branched alkyl residue having 1 to 12 carbon atoms in which optionally one or more non-adjacent alkyl -CH₂- groups are replaced by -O-, -CO-, -CO-O-, -O-CO-, -CH=CH- and -C≡C-.

5

25. Diamine compounds according to anyone of claims 22 to 24, wherein F is selected from -OR² and -NR³R⁴, wherein R² and R³ represent a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, cyano, having 1 to 18 carbons atoms, wherein one or more non-adjacent alkyl -CH₂- groups may independently be replaced by -O- or -CH=CH-, wherein R⁴ is selected from a hydrogen atom or a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, cyano, having 1 to 18 carbons atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by -O- or -CH=CH-, or R⁴ and R⁵ together to form a C₅-₈ alicyclic ring.

10

15

26. Diamine compounds according to anyone of claims 22 to 26, wherein F is selected from the group comprising -OR² or -NHR³, wherein R² and R³ represent a cyclic, straight-chain or branched alkyl residue which is unsubstituted, mono- or poly- substituted by fluorine atoms, having 1 to 18 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced by -O-.

20

25

27. Diamine compounds according to anyone of claims 22 to 26, wherein G is a hydrogen atom, or fluorine atom, or chlorine atom, or a straight-chain or branched alkyl group which is unsubstituted, mono-substituted by cyano, fluorine or chlorine or poly-substituted by fluorine, chlorine, having 1 to 18 carbon atoms, wherein one or more -CH₂- groups may independently be replaced -O-, -CO-, -CO-O-, -O-CO-, -NR¹-, -NR¹-CO-, -CO-NR¹-, -NR¹-CO-O-, -O-CO-NR¹-, -NR¹-CO-NR¹-, -CH=CH-, -C≡C- and -O-CO-O-, an

30

aromatic or an alicyclic group, with the proviso that oxygen atoms are not directly attached to each other, and wherein R¹ represents a hydrogen atom or lower alkyl.

5 28. Diamine compounds according to anyone of claims 22 to 27, wherein G is a hydrogen atom, or a straight-chain or branched alkyl group having 1 to 18 carbon atoms, wherein one or more non-adjacent -CH₂- groups may independently be replaced -O-, -CO-, -CO-O-, -O-CO-, -NR¹-, -NR¹-CO-, -CO-NR¹-, and -O-CO-O-, with the proviso that oxygen atoms are not directly attached to each other, and wherein R¹ represents a hydrogen atom or lower alkyl.

10

15 29. Diamine compounds according to anyone of claims 22 to 28, wherein S² is selected from a single covalent bond, -CO-O-, -CO-NR¹-, -CO- and a straight-chain or branched alkylene group which is unsubstituted, mono or poly-substituted by fluorine, chlorine, or cyano, having 1 to 24 carbon atoms, wherein one or more -CH₂- groups may independently be replaced by a group J, with the proviso that oxygen atoms are not directly attached to each other, wherein R¹ represents a hydrogen atom or lower alkyl.

20

25 30. Diamine compounds according to anyone of claims 22 to 29, wherein S² is selected from a single covalent bond, -CO-O-, -CO-, -(CH₂)_r, -(CH₂)_rO-, -(CH₂)_r-CO-, -(CH₂)_r-CO-O-, -(CH₂)_rO-CO-, -(CH₂)_r-CO-NR¹-, -CO-O-(CH₂)_rO-, -(CH₂)_r-NR¹-CO-, -(CH₂)_r-NR¹-, -CO-O-(CH₂)_r, -CO-NR¹-(CH₂)_r, -CO-NR¹-(CH₂)_rO-, -CO-NR¹-(CH₂)_r-NR¹-, -CO-NR¹-(CH₂)_r-O-CO-, -(CH₂)_r-O-(CH₂)_s-, -(CH₂)_r-CO-O-(CH₂)_s-, -(CH₂)_r-O-CO-(CH₂)_s-, -(CH₂)_r-NR¹-CO-(CH₂)_s-, -(CH₂)_r-O-(CH₂)_s-O-, -(CH₂)_r-CO-O-(CH₂)_s-O-, -(CH₂)_r-O-CO-(CH₂)_s-O-, -(CH₂)_r-NR¹-CO-(CH₂)_s-O-, -(CH₂)_r-NR¹-CO-O-(CH₂)_s-O-, 30 -CO-O-(CH₂)_r-O-(CH₂)_s- and -CO-O-(CH₂)_r-O-(CH₂)_s-O-, wherein R¹ is as defined above, r and s each represent an integer from 1 to 20, preferably from 1 to 12, and r + s ≤ 21, preferably ≤ 15.

31. Diamine compounds according to anyone of claims 22 to 30, wherein S² is selected from a single covalent bond, -(CH₂)_r, -(CH₂)_rO-, -(CH₂)_rCO-O-, -(CH₂)_rO-CO-, -(CH₂)_rCO-NH-, -(CH₂)_rNH-CO-, -CO-O-(CH₂)_r, -CO-NH-(CH₂)_r, -CO-O-(CH₂)_rO-, -CO-NH-(CH₂)_rO-, 5 -(CH₂)_rNH-CO-(CH₂)_s-, -(CH₂)_rNH-CO-O-(CH₂)_s-, -(CH₂)_rO-(CH₂)_sO-, -(CH₂)_rNH-CO-(CH₂)_sO-, -(CH₂)_rNH-CO-O-(CH₂)_sO-, -CO-O-(CH₂)_rO-(CH₂)_sO-, and -CO-(CH₂)_rNH-CO-(CH₂)_sO-, wherein r and s each represent an integer from 1 to 12 and r + s ≤ 15.

10 32. Diamine compounds according to anyone of claims 22 to 31, wherein S² include 1,2-ethylen, 1,3-propylen, 1,4-butylen, 1,5-pentylen, 1,6-hexylen, 1,7-heptylen, 1,8-octylen, 1,9-nonylen, 1,10-decylen, 1,11-undecylen, 1,12-dodecylen, 3-methyl-1,4-butylen, 2-(methylenoxy)ethylen, 3- 15 (methylenoxy)propylen, 4-(methylenoxy)butylen, 5-(methylenoxy)pentylen, 6-(methylenoxy)hexylen, 7-(methylenoxy)heptylen, 8-(methylenoxy)octylen, 9-(methylenoxy)nonylen, 10-(methylenoxy)decylen, 11-(methylenoxy)undecylen, 12-(methylenoxy)dodecylen, 2-(carbonyloxy)ethylen, 3-(carbonyloxy)propylen, 4-(carbonyloxy)butylen, 20 5-(carbonyloxy)pentylen, 6-(carbonyloxy)hexylen, 7-(carbonyloxy)heptylen, 8-(carbonyloxy)octylen, 9-(carbonyloxy)nonylen, 10-(carbonyloxy)decylen, 11-(carbonyloxy)undecylen, 12-(carbonyloxy)dodecylen, 2-(carbonylamino)ethylen, 3-(carbonylamino)propylen, 4-(carbonylamino)butylen, 5-(carbonylamino)pentylen, 25 6-(carbonylamino)hexylen, 7-(carbonylamino)heptylen, 8-(carbonylamino)octylen, 9-(carbonylamino)nonylen, 10-(carbonylamino)decylen, 11-(carbonylamino)undecylen, 12-(carbonylamino)dodecylen, 3-propylenoxy, 3-propylenoxycarbonyl, 2-ethylenoyloxy, 4-butyleneoxy, 4-butyleneoxycarbonyl, 3-propyleneoyloxy, 30 5-pentylenoxy, 5-pentylenoxycarbonyl, 4-butyleneoyloxy, 6-hexylenoxy, 6-hexylenoxycarbonyl, 5-pentylenoyloxy, 7-heptylenoxy, 7-heptylenoxycarbonyl, 6-hexylenoyloxy, 8-octylenoxy, 8-octylenoxycarbonyl, 7-heptylenoyloxy,

9-nonylenoxy, 9-nonylenoxycarbonyl, 8-octylenoyloxy, 10-decylenoxy,
10-decylenoxycarbonyl, 9-nonylenoyloxy, 11-undecylenoxy,
11-undecylenoxycarbonyl, 10-decylenoyloxy, 12-dodecylenoxy,
12-dodecylenoxycarbonyl, 11-undecylenoyloxy, 3-propylenaminocarbonyl,
5 4-butylenaminocarbonyl, 5-pentylenaminocarbonyl, 6-hexylenaminocarbonyl,
7-heptylenaminocarbonyl, 8-octylenaminocarbonyl, 9-nonylenaminocarbonyl,
10-decylenaminocarbonyl, 11-undecylenaminocarbonyl,
12-dodecylenaminocarbonyl, 2-ethylenoylamino, 3-propylenoylamino,
4-butylenoylamino, 5-pentylenoylamino, 6-hexylenoylamino,
10 7-heptylenoylamino, 8-octylenoylamino, 9-nonylenoylamino,
10-decylenoylamino, 11-undecylenoylamino, 2-(methylenoxy)ethanoyloxy,
3-(methylenoxy)propyloxy, 3-(methylenoxy)propyloxycarbonyl,
4-(methylenoxy)butyloxy, 4-(methylenoxy)butyloxycarbonyl,
3-(methylenoxy)propanoyloxy, 5-(methylenoxy)pentylloxy,
15 5-(methylenoxy)pentylloxycarbonyl, 4-(methylenoxy)butanoyloxy,
6-(methylenoxy)hexyloxy, 6-(methylenoxy)hexyloxycarbonyl,
5-(methylenoxy)pentanoyloxy, 7-(methylenoxy)heptyloxy,
7-(methylenoxy)heptyloxycarbonyl, 6-(methylenoxy)hexanoyloxy,
8-(methylenoxy)octyloxy, 8-(methylenoxy)octyloxycarbonyl,
20 7-(methylenoxy)heptanoyloxy, 9-(methylenoxy)nonyloxy,
9-(methylenoxy)nonyloxycarbonyl, 8-(methylenoxy)octanoyloxy,
10-(methylenoxy)decyloxy, 10-(methylenoxy)decyloxycarbonyl,
9-(methylenoxy)nonanoyloxy, 11-(methylenoxy)undecyloxy,
11-(methylenoxy)undecyloxycarbonyl, 10-(methylenoxy)decanoyloxy,
25 12-(methylenoxy)dodecyloxy, 12-(methylenoxy)dodecyloxycarbonyl,
11-(methylenoxy)undecanoyloxy, 3-(methylenoxy)propylaminocarbonyl,
4-(methylenoxy)butylaminocarbonyl, 5-(methylenoxy)pentylaminocarbonyl,
6-(methylenoxy)hexylaminocarbonyl, 7-(methylenoxy)heptylaminocarbonyl,
8-(methylenoxy)octylaminocarbonyl, 9-(methylenoxy)nonylaminocarbonyl,
30 10-(methylenoxy)decylaminocarbonyl, 11-(methylenoxy)undecylaminocarbonyl,
12-(methylenoxy)dodecylaminocarbonyl, 2-(methylenoxy)ethanoylamino,
3-(methylenoxy)propanoylamino, 4-(methylenoxy)butanoylamino,

5-(methylenoxy)pentanoylamino, 6-(methylenoxy)hexanoylamino,
7-(methylenoxy)heptanoylamino, 8-(methylenoxy)octanoylamino,
9-(methylenoxy)nonanoylamino, 10-(methylenoxy)decanoylamino,
11-(methylenoxy)undecanoylamino, 12-(methylenoxy)dodecylaminocarbonyl,
5 2-(carbonyloxy)ethanoyloxy, 3-(carbonyloxy)propyloxy,
3-(carbonyloxy)propyloxycarbonyl, 4-(carbonyloxy)butyloxy,
4-(carbonyloxy)butyloxycarbonyl, 3-(carbonyloxy)propanoyloxy,
5-(carbonyloxy)pentyloxy, 5-(carbonyloxy)pentyloxycarbonyl,
4-(carbonyloxy)butanoyloxy, 6-(carbonyloxy)hexyloxy,
10 6-(carbonyloxy)hexyloxycarbonyl, 5-(carbonyloxy)pentanoyloxy,
7-(carbonyloxy)heptyloxy, 7-(carbonyloxy)heptyloxycarbonyl,
6-(carbonyloxy)hexanoyloxy, 8-(carbonyloxy)octyloxy,
8-(carbonyloxy)octyloxycarbonyl, 7-(carbonyloxy)heptanoyloxy,
9-(carbonyloxy)nonyloxy, 9-(carbonyloxy)nonyloxycarbonyl,
15 8-(carbonyloxy)octanoyloxy, 10-(carbonyloxy)decyloxy,
10-(carbonyloxy)decyloxycarbonyl, 9-(carbonyloxy)nonanoyloxy,
11-(carbonyloxy)undecyloxy, 11-(carbonyloxy)undecyloxycarbonyl,
10-(carbonyloxy)decanoyloxy, 12-(carbonyloxy)dodecyloxy,
12-(carbonyloxy)dodecyloxycarbonyl, 11-(carbonyloxy)undecanoyloxy,
20 3-(carbonyloxy)propylaminocarbonyl, 4-(carbonyloxy)butylaminocarbonyl,
5-(carbonyloxy)pentylaminocarbonyl, 6-(carbonyloxy)hexylaminocarbonyl,
7-(carbonyloxy)heptylaminocarbonyl, 8-(carbonyloxy)octylaminocarbonyl,
9-(carbonyloxy)nonylaminocarbonyl, 10-(carbonyloxy)decylaminocarbonyl,
11-(carbonyloxy)undecylaminocarbonyl,
25 12-(carbonyloxy)dodecylaminocarbonyl, 2-(carbonyloxy)ethanoylamino,
3-(carbonyloxy)propanoylamino, 4-(carbonyloxy)butanoylamino,
5-(carbonyloxy)pentanoylamino, 6-(carbonyloxy)hexanoylamino,
7-(carbonyloxy)heptanoylamino, 8-(carbonyloxy)octanoylamino,
9-(carbonyloxy)nonanoylamino, 10-(carbonyloxy)decanoylamino,
30 11-(carbonyloxy)undecanoylamino, 12-(carbonyloxy)dodecylaminocarbonyl,
6-(3-propylenaminocarbonyloxy)hexylen, 6-(3-propylenoxy)hexylen,
6-(3-propylenoxy)hexyloxy, 6-(3-propylenaminocarbonyloxy)hexyloxy,

6-(3-propylenaminocarbonyl)hexyl, 6-(3-propylenaminocarbonyl)hexyloxy,
2-(methylenoxy)ethyloxycarbonyloxy, 3-(methylenoxy)propyloxycarbonyloxy,
6-(methylenoxy)hexyloxycarbonyloxy, 2-(methylenoxycarbonyl)ethylen,
3-(methylenoxycarbonyl)propyloxycarbonyloxy,
5 6-(methylenoxycarbonyl)hexyloxycarbonyloxy,
6-(3-propylenoxycarbonyloxy)hexylen, 6-(3-propylenoxycarbonyl)hexylen,
2-(methylenaminocarbonyl)ethylen, 3-(methylenaminocarbonyl)propylen,
6-(methylenaminocarbonyl)hexylen, 6-(3-propylenaminocarbonyloxy)hexylen,
6-(3-propylenaminocarbonyl)hexylen, 4-{[6-(methylenoxy)hexyl]oxy}phenylen,
10 4-[6-(methylenoxy)hexyl]cyclohexylen,
3-methoxy-4-{[6-(methylenoxy)hexyl]oxy}phenylen,
4-{[6-(methylenoxy)hexyl]oxy}phenylcarbonyloxy,
4-[6-(methylenoxy)hexyl]cyclohexanoyloxy,
3-ethoxy-4-{[8-(methylenoxy)octyl]oxy}phenylcarbonyloxy,
15 4-[3-(carbonyloxy)propyl]phenylen, 4-[6-(carbonyloxy)hexyl]phenylen,
4-[6-(carbonyloxy)hexyl]cyclohexylen,
3-methoxy-4-[6-(carbonyloxy)hexyl]phenylen,
4-[6-(carbonyloxy)hexyl]phenylcarbonyloxy,
4-[6-(carbonyloxy)hexyl]cyclohexanoyloxy,
20 3-ethoxy-4-[8-(carbonyloxy)octyl]phenylcarbonyloxy,
2-{4-[2-(methylenoxy)ethyl]cyclohexyl}phenyl}ethoxy,
1-[4'-{[4-(methylenoxy)butyl]oxy}-1,1'biphenyl-4-yl]carbonyloxy,
1-{4-[4-{2-(methylenoxy)ethoxy}phenyl]methyloxy, 2-{4-[4-(2-carbonyloxyethyl)
25 cyclohexyl]phenyl}ethoxy, 2-[4'-(4-carbonyloxybutyl)-1,1'biphenyl-4-yl]ethoxy,
6-{4-[4-(2-carbonyloxyethyl)phenyl]hexyloxy,
5-{[4'-[4-(methylenoxy)butoxy]-1,1'-biphenyl-4-yl]oxy}pentanoyloxy and the like.

33. Diamine compounds according to anyone of claims 22 to 32, S³ is
selected from -CO-O-, -CO-NR¹-, -CO- and a straight-chain or branched
30 alkylene group which is unsubstituted, mono or poly-substituted by fluorine,
chlorine, or cyano, having 1 to 24 carbon atoms, wherein one or more -CH₂-
groups may independently be replaced by a group J, with the proviso that

oxygen atoms are not directly attached to each other, wherein R¹ represents a hydrogen atom or lower alkyl.

34. Diamine compounds according to anyone of claims 22 to 33, wherein S³ 5 is selected from a single covalent bond, -(CH₂)_r, -CO-(CH₂)_r, -CO -O -(CH₂)_r, -CO -NR¹ -(CH₂)_r, -(CH₂)_r-O-(CH₂)_s-, -(CH₂)_r-CO-O-(CH₂)_s-, -(CH₂)_r-O-CO-(CH₂)_s-, -(CH₂)_r-NR¹-CO-(CH₂)_s-, -(CH₂)_r-NR¹-CO-O-(CH₂)_s-, and -CO-O-(CH₂)_r-O-(CH₂)_s-, wherein R¹ is as defined herein above; r and s each represent an integer from 1 to 20; and r + s ≤ 21. It is more preferred that 10 r and s each represent an integer from 1 to 12. It is especially preferred that r + s ≤ 15.

35. Diamine compounds according to anyone of claims 22 to 34, wherein S³ include 1,2-ethylen, 1,3-propylen, 1,4-butylen, 1,5-pentylen, 1,6-hexylen, 15 1,7-heptylen, 1,8-octylen, 1,9-nonylen, 1,10-decylen, 1,11-undecylen, 1,12-dodecylen, 3-methyl-1,4-butylen, 2-(methylenoxy)ethylen, 3-(methylenoxy)propylen, 4-(methylenoxy)butylen, 5-(methylenoxy)pentylen, 6-(methylenoxy)hexylen, 7-(methylenoxy)heptylen, 8-(methylenoxy)octylen, 9-(methylenoxy)nonylen, 10-(methylenoxy)decylen, 20 11-(methylenoxy)undecylen, 12-(methylenoxy)dodecylen, 2-(carbonyloxy)ethylen, 3-(carbonyloxy)propylen, 4-(carbonyloxy)butylen, 5-(carbonyloxy)pentylen, 6-(carbonyloxy)hexylen, 7-(carbonyloxy)heptylen, 8-(carbonyloxy)octylen, 9-(carbonyloxy)nonylen, 10-(carbonyloxy)decylen, 11-(carbonyloxy)undecylen, 12-(carbonyloxy)dodecylen, 25 2-(carbonylamino)ethylen, 3-(carbonylamino)propylen, 4-(carbonylamino)butylen, 5-(carbonylamino)pentylen, 6-(carbonylamino)hexylen, 7-(carbonylamino)heptylen, 8-(carbonylamino)octylen, 9-(carbonylamino)nonylen, 10-(carbonylamino)decylen, 11-(carbonylamino)undecylen, 30 12-(carbonylamino)dodecylen, 6-(3-propylenaminocarbonyloxy)hexylen, 6-(3-propylenaminocarbonyl)hexyl, 2-(methylenoxycarbonyl)ethylen, 6-(3-propylenoxycarbonyloxy)hexylen,

6-(3-propylenoxycarbonyl)hexylen, 2-(methylenaminocarbonyl)ethylen,
3-(methylenaminocarbonyl)propylen, 6-(methylenaminocarbonyl)hexylen,
6-(3-propylenaminocarbonyloxy)hexylen, 6-(3-propylenaminocarbonyl)hexylen ,
4-{[6-(methylenoxy)hexyl]oxy}phenylen, 4-[6-(methylenoxy)hexyl]cyclohexylen,
5 3-methoxy-4-{[6-(methylenoxy)hexyl]oxy}phenylen,
4-[3-(carbonyloxy)propyl]phenylen, 4-[6-(carbonyloxy)hexyl]phenylen,
4-[6-(carbonyloxy)hexyl]cyclohexylen, 3-methoxy-
4-[6-(carbonyloxy)hexyl]phenylen and the like.

10

36. Diamine compounds according to anyone of claims 22 to 35, wherein Q is an oxygen atom or -NH-.

15

37. Diamine compounds according to anyone of claims 22 to 36, wherein Q is an oxygen atom.

38. Diamine compounds according to anyone of claims 22 to 37, wherein X and Y represent hydrogen.

20

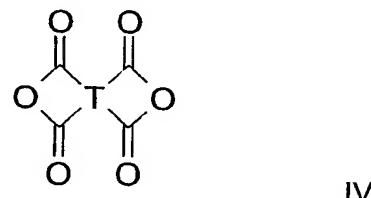
39. Diamine compounds according to anyone of claims 22 to 37, wherein the photoactive groups are groups of formula IIIa.

40. Use of a diamine compound according to anyone of claims 22 to 39 as precursor for the production of liquid crystal alignment layers.

25

41. A liquid crystal orientation material obtained by the reaction of a diamine compound of general formula I.

42. A polymer from the class of polyamic acids, polyamic acid esters or polyimides obtained by the reaction of a diamine compound of general formula I with one or more tetracarboxylic acid anhydride of general formula IV:



wherein T represents a tetravalent organic radical.

43. A polymer according to claim 42 obtained by the reaction of a diamine compound of general formula I and one or more additional diamines with one or more tetracarboxylic acid anhydride of general formula IV

44. A polymer according to claims 42 or 43, wherein T is derived from an aliphatic, alicyclic or aromatic tetracarboxylic acid dianhydride.

15

45. A polymer according to claim 44, wherein the aliphatic or alicyclic tetracarboxylic acid dianhydride is

1,1,4,4-butanetetracarboxylic acid dianhydride,

ethylenemaleic acid dianhydride,

20 1,2,3,4-cyclobutanetetracarboxylic acid dianhydride,

1,2,3,4-cyclopantanetetracarboxylic acid dianhydride,

2,3,5-tricarboxycyclopentylacetic acid dianhydride,

3,5,6-tricarboxynorbornylacetic acid dianhydride,

2,3,4,5-tetrahydrofuran-tetracarboxylic acid dianhydride,

25 rel-[1S,5R,6R]-3-oxabicyclo[3.2.1]octane-2,4-dione-6-spiro-3'-(tetrahydrofuran-2',5'-dione),

4-(2,5-dioxotetrahydrofuran-3-yl)tetrahydronaphthalene-1,2-dicarboxylic acid dianhydride,

5-(2,5-dioxotetrahydrofuran-3-yl)-3-methyl-3-cyclohexene-1,2-dicarboxylic acid

dianhydride,

bicyclo[2.2.2]oct-7-ene-2,3,5,6-tetracarboxylic acid dianhydride,

bicyclo[2.2.2]octane-2,3,5,6-tetracarboxylic acid dianhydride,

1,8-dimethylbicyclo[2.2.2]oct-7-ene-2,3,5,6-tetracarboxylic acid dianhydride

5 and the like.

46. A polymer according to claims 44 or 45, wherein the aromatic tetracarboxylic acid dianhydride is pyromellitic acid dianhydride,

3,3',4,4'-benzophenonetetracarboxylic acid dianhydride,

10 4,4'-oxydiphthalic acid dianhydride,

3,3',4,4'-diphenylsulfonetetracarboxylic acid dianhydride,

1,4,5,8-naphthalenetetracarboxylic acid dianhydride,

2,3,6,7-naphthalenetetracarboxylic acid dianhydride,

3,3',4,4'-dimethyldiphenylsilanetetracarboxylic acid dianhydride,

15 3,3',4,4'-tetraphenylsilanetetracarboxylic acid dianhydride,

1,2,3,4-furantetracarboxylic acid dianhydride,

4,4'-bis(3,4-dicarboxyphenoxy)diphenyl sulfide dianhydride,

4,4'-bis(3,4-dicarboxyphenoxy)diphenyl sulfone dianhydride,

4,4'-bis(3,4-dicarboxyphenoxy)diphenylpropane dianhydride,

20 3,3',4,4'-biphenyltetracarboxylic acid dianhydride,

ethylene glycol bis(trimellitic acid) dianhydride,

4,4'-(1,4-phenylene)bis(phthalic acid) dianhydride,

4,4'-(1,3-phenylene)bis(phthalic acid) dianhydride,

4,4'-(hexafluoroisopropylidene)diphthalic acid dianhydride,

25 4,4'-oxydi(1,4-phenylene)bis(phthalic acid) dianhydride,

4,4'-methylenedi(1,4-phenylene)bis(phthalic acid) dianhydride

and the like.

47. A polymer according to anyone of claims 44 to 46, wherein the 30 tetracarboxylic acid dianhydrides are

1,2,3,4-cyclobutanetetracarboxylic acid dianhydride,

1,2,3,4-cyclopentanetetracarboxylic acid dianhydride,

2,3,5-tricarboxycyclopentylacetic acid dianhydride,
5-(2,5-dioxotetrahydrofuran-3-yl)-3-methyl-3-cyclohexene-1,2-dicarboxylic acid
dianhydride,
4-(2,5-dioxotetrahydrofuran-3-yl)tetrahydronaphthalene-1,2-dicarboxylic acid
5 dianhydride,
4,4'-(hexafluoroisopropylidene)diphthalic acid dianhydride and
bicyclo[2.2.2]oct-7-ene-2,3,5,6-tetracarboxylic acid dianhydride.

48. A polymer according to anyone of claims 43 to 47, wherein the additional
10 diamine is ethylenediamine, 1,3-propylenediamine, 1,4-butylenediamine,
1,5-pentylenediamine, 1,6-hexylenediamine, 1,7-heptylenediamine,
1,8-octylenediamine, 1,9-nonylenediamine, 1,10-decylenediamine,
1,11-undecylenediamine, 1,12-dodecylenediamine, α,α' -diamino-*m*-xylene,
 α,α' -diamino-*p*-xylene, (5-amino2,2,4-trimethylcyclopentyl)methylamine,
15 1,2-diaminocyclohexane, 4,4'-diaminodicyclohexylmethane,
1,3-bis(methylamino)cyclohexane, 4,9-dioxadodecane-1,12-diamine,
3,5-diaminobenzoic acid methyl ester, 3,5-diaminobenzoic acid hexyl ester,
3,5-diaminobenzoic acid dodecyl ester,
3,5-diaminobenzoic acid isopropyl ester, 4,4'-methylenedianiline,
20 4,4'-ethylenedianiline, 4,4'-diamino-3,3'-dimethyldiphenylmethane,
3,3',5,5'-tetramethylbenzidine, 4,4'-diaminodiphenyl sulfone,
4,4'-diaminodiphenyl ether, 1,5-diaminonaphthalene,
3,3'-dimethyl-4,4'-diaminobiphenyl, 3,4'-diaminodiphenyl ether,
3,3'-diaminobenzophenone, 4,4'-diaminobenzophenone,
25 4,4'-diamino-2,2'-dimethylbibenzyl, bis[4-(4-aminophenoxy)phenyl] sulfone,
1,4-bis(4-aminophenoxy)benzene, 1,3-bis(4-aminophenoxy)benzene,
1,3-bis(3-aminophenoxy)benzene, 2,7-diaminofluorene,
9,9-bis(4-aminophenyl)fluorene, 4,4'-methylenebis(2-chloroaniline),
4,4'-bis(4-aminophenoxy)biphenyl, 2,2',5,5'-tetrachloro-4,4'-diaminobiphenyl,
30 2,2'-dichloro-4,4'-diamino-5,5'-dimethoxybiphenyl,
3,3'-dimethoxy-4,4'-diaminobiphenyl,
4,4'-(1,4-phenyleneisopropylidene)bisaniline,

4,4'-(1,3-phenyleneisopropylidene)bisaniline,
2,2-bis[4-(4-aminophenoxy)phenyl]propane,
2,2-bis[3-(4-aminophenoxy)phenyl]hexafluoropropane,
2,2-bis[3-amino-4-methylphenyl]hexafluoropropane,
5 2,2-bis(4-aminophenyl)hexafluoropropane,
2,2'-bis[4-(4-amino-2-trifluoromethylphenoxy)phenyl]hexafluoropropane,
4,4'-diamino-2,2'-bis(trifluoromethyl)biphenyl, and
4,4'-bis[(4-amino-2-trifluoromethylphenoxy)-2,3,5,6,2',3',5',6'-
octafluorobiphenyl].

10

49. A polymer according to anyone of claims 42 to 48, wherein the polymer comprise as side-chains a photoreactive group that can be photoisomerized and/or photodimerized on exposure to UV or laser light.

15

50. A polymer according to anyone of claims 42 to 49, wherein at least 75 % of repeating units include a side chain with a photoreactive group.

51. A polymer according to anyone of claims 42 to 50 having an intrinsic viscosity in the range of 0.05 to 10 dL/g.

20

52. A polymer according to anyone of claims 42 to 51 having an intrinsic viscosity in the range of 0.05 to 5 dL/g.

25

53. A polymer according to anyone of claims 42 to 52 comprising from 2 to 2000 repeating units.

54. A polymer according to anyone of claims 42 to 53 comprising from 3 to 200 repeating units.

30

55. A polymer according to anyone of claims 42 to 54 further comprising additives such as silane-containing compounds and epoxy-containing cross-linking agents.

56. A polymer according to claim 55, wherein the epoxy-containing crosslinking agents include 4,4'-methylene-bis-(*N,N*-diglycidylaniline), trimethylolpropane triglycidyl ether, benzene-1,2,4,5-tetracarboxylic acid 1,2:4,5-*N,N*'-diglycidylidene, polyethylene glycol diglycidyl ether, *N,N*-diglycidylcyclohexylamine and the like.

5 57. A polymer according to anyone of claims 42 to 56 further comprising additional additives such as a photosensitizer, a photoradical generator and/or 10 a cationic photoinitiator.

15 58. A polymer according to claim 57, wherein the additional additive includes 2,2-dimethoxyphenylethanone, a mixture of diphenylmethanone and *N,N*-dimethylbenzenamine or ethyl 4-(dimethylamino)benzoate, xanthone, thioxanthone, Irgacure™ 184, 369, 500, 651 and 907 (Ciba), Michler's ketone, and triaryl sulfonium salt.

20 59. A polymer layer comprising a polymer according to anyone of claims 42 to 58 in a crosslinked form.

60. A polymer layer according to claim 59 as orientation layers for liquid crystals.

25 61. A polymer layer according to claims 59 or 60 further comprising other polymers, oligomers, monomers, photoactive polymers, photoactive oligomers and/or photoactive monomers

30 62. Use of a polymer layer according to claims 60 or 61 in the manufacture of optical constructional elements, preferably in the production of hybrid layer elements.

63. Method of preparing a polymer layer according to anyone of claims 59 to 61 by applying one or more polymers according to claims 42 to 58 to a support and, after any optional imidisation step, crosslinking the polymer or polymer mixture by irradiation with linearly polarized light.

5

64. Polymer layers according to claims 42 to 58 having a thickness of 0.05 to 50 µm.

10

65. Use of polymer layers according to anyone of claims 59 to 61 in the production of optical or electro-optical devices as well as unstructured and structured optical elements and multi-layer systems.

66. Optical or electro-optical device comprising one or more polymers according to anyone of claims 42 to 58 in crosslinked form.

15

67. Electro-optical devices according to claim 66 comprising more than one layer.